WHAT IS CLAIMED IS:

1. A system for monitoring locations of movable objects, comprising:

a plurality of beacons mounted in spatial distribution throughout a monitoring area of a building, each beacon transmitting wireless interrogation signals during assigned timeslots of a time division multiple access (TDMA) frame;

a plurality of transponders, each transponder adapted to be attached to a moveable object, and to respond to the interrogation signals received from the beacons by echoing frequency-shifted versions of the interrogation signals ("transponder responses"); and

a receiver that analyzes signals received from the plurality of beacons;

wherein each beacon retransmits an interrogation signal and a resulting transponder response to the receiver for analysis, and the receiver determines a time difference between the interrogation signal and the transponder response retransmitted by the beacon, said time difference reflecting a distance between the beacon and the transponder.

2. The system as in Claim 1, wherein the transponders are assigned to transponder timeslots of the TDMA frame.

3. The system as in Claim 1, wherein the plurality of beacons become synchronized with each other by monitoring a phase of an alternating current (AC) power signal on power lines of the building.

4. The system as in Claim 3, wherein at least some of the beacons monitor the phase of the AC power signal by monitoring an AC flicker of lights within the building.

5. The system as in Claim 1, wherein at least some of the beacons are photo-electrically powered.

6. The system as in Claim 1, wherein the wireless interrogation signals are radio frequency (RF) signals.

7. The system as in Claim 1, wherein the wireless interrogation signals are ultrasonic signals.

8. The system as in Claim 1, wherein each interrogation signal includes a linear ramp portion in which a frequency of the interrogation signal is ramped linearly over a period of time, and wherein the receiver measures a time difference between the linear ramp portion as included in the retransmitted interrogation and transponder response signals received from a beacon.

9. The system as in Claim 8, wherein the receiver measures the time difference by detecting, and determining a time difference between, peaks of the linear ramp portion.

10. The system as in Claim 1, wherein each beacon retransmits the interrogation signal and the resulting transponder response to the receiver over a wireless channel.

11. The system as in Claim 1, wherein each beacon retransmits the interrogation signal and the resulting transponder response to the receiver over AC power lines of the building.

12. The system as in Claim 1, further comprising a computer system that uses time differences measured by the receiver in combination with a topological tracking method to determine the locations of the objects.

13. The system as in Claim 1, wherein at least some of the transponders are wristbands adapted to be worn by patients.

14. The system as in Claim 1, wherein at least one of the transponders comprises a transponder module which is adapted to be inserted into a disposable wristband.

15. A method of determining the distance between a beacon and a transponder, comprising:

(a) transmitting an interrogation signal by wireless communications from the beacon to the transponder within an interrogation frequency band of the transponder to cause the transponder to return a response signal, the response signal being a frequency-shifted version of the interrogation signal;

(b) concurrently with (a), transmitting the interrogation signal from the beacon to a receiver which is positioned remotely from the beacon;

(c) at the beacon, receiving and retransmitting to the receiver the response signal returned by the transponder; and

(d) with the receiver, determining a time difference between the interrogation signal transmitted by the beacon in (b) and the response signal retransmitted by the beacon in (c), said time difference reflecting a signal propagation time between the beacon and the transponder.

16. The method as in Claim 15, wherein the interrogation signal includes a linear ramp portion in which a frequency of the interrogation signal is ramped linearly over a period of time, and wherein (d) comprises the receiver measuring a time difference between corresponding linear ramp portions included in the interrogation and response signals received from the beacon.

17. The method as in Claim 15, wherein the interrogation signal includes a root-raised cosine waveform, and wherein (d) comprises the receiver detecting and measuring a time difference between corresponding root-raised cosine waveforms included in the interrogation and response signals received from the beacon.

18. The method as in Claim 15, wherein (b) comprises transmitting the interrogation signal by wireless communications from the beacon within a frequency band that is separate from the interrogation frequency band.

19. The method as in Claim 18, wherein (b) further comprises transmitting the interrogation signal from the beacon at a higher transmission power than a transmission power used in (a) to transmit the interrogation signal.

20. The method as in Claim 15, wherein (b) comprises transmitting the interrogation signal to the receiver over power lines of a building.

21. The method as in Claim 15, wherein (a) comprises transmitting the interrogation signal during a TDMA timeslot assigned to the beacon.

22. The method as in Claim 15, further comprising the beacon determining a timing of the TDMA timeslot by monitoring a phase of an AC power signal on power lines of a building.

23. A transponder device adapted to be worn by a patient to permit the patient's location to be monitored, the transponder device comprising:

a disposable wristband; and

a transponder module which is adapted to be releasably attached to the disposable wristband, the transponder module including a transponder circuit that is responsive to a wireless interrogation signal received within a first frequency band by echoing the interrogation signal within a second frequency band.

24. The transponder device as in Claim 23, wherein the disposable wristband includes a battery which powers the transponder module.

25. The transponder device as in Claim 24, wherein the battery is a zinc air battery.

26. The transponder device as in Claim 23, wherein the transponder module is adapted to sense an identifier of the disposable wristband.

27. The transponder device as in Claim 26, wherein the identifier is printed on a surface of the wristband in a conductive ink.

28. The transponder device as in Claim 26, wherein the identifier is encoded within a passive electrical circuit of the disposable wristband.

29. The transponder device as in Claim 23, wherein the transponder circuit uses a periodically transmitted synchronization sequence to determine when to echo interrogation signals.

30. The transponder device as in Claim 23, wherein the transponder circuit echoes interrogation signals only during an assigned timeslot.

31. The transponder device as in Claim 30, wherein the timeslot is derived from a phase of an AC power signal.

32. The transponder device as in Claim 23, wherein the transponder module is adapted to be sterilized between uses.

33. The transponder device as in Claim 23, wherein the transponder circuit is responsive to interrogation signals in an ultrasonic band.

34. The transponder device as in Claim 23, wherein the transponder circuit is responsive to interrogation signals in a radio frequency band.

35. A disposable wristband adapted for use in monitoring locations of patients, comprising:

a base portion which houses a battery for providing power to a transponder module, the housing being configured to releasably receive the transponder module such that the transponder module may be removed from the base portion and reused following use by a patient;

a wristband portion attached to the base portion for attachment to the wrist of a patient; and

an identifier portion which embodies an identifier such that the identifier is readable by the transponder module when the transponder module is inserted within the base portion.

36. The disposable wristband as in Claim 35, wherein the battery is a zinc air battery.

37. The disposable wristband as in Claim 35, wherein the identifier is printed on a surface of the housing in conductive ink.

38. The disposable wristband as in Claim 35, wherein the identifier is encoded within a passive circuit which is adapted to be measured by the transponder module.

39. The disposable wristband as in Claim 35, in combination with a transponder module which is adapted to sense the identifier.